



# Decision Support System for Determining Suppliers to Purchase Goods using the Analytical Hierarchy Process Method at PT. Nippon Indosari Corpindo, Tbk

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## ABSTRACT

PT. Nippon Indosari Corpindo, Tbk is one of the companies engaged in the industry where the supply and receipt of goods or materials and support in the running of the production process is the most important thing in the process of running this company. That is why in accepting every item from the supplier, it must be well determined and designed to expedite every process, both production and processing inside. Decision support system that can process all data related to computerized supplier performance in order to get better results is of course using the AHP (Analytical Hierarchy Process) method. Decision support systems by mixing several calculation methods are expected to produce good results and are suitable for determining suppliers with outranking systems so that a viable supplier can be sorted by the best value.

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## 1. INTRODUCTION

In a company, every company leader always tries so that the company continues to grow, run smoothly and generate maximum profit or profit by minimizing the costs incurred that are reasonable for the activities they carry out, because the profit or profit generated by companies is a benchmark or a barometer of the company's progress and is also the success of a company leader [1].

Nippon Indosari Corpindo Tbk is one of the biggest bakery companies with the Sari Roti trademark in Indonesia. The company was founded in 1995 as a foreign investment company under the name PT Nippon Indosari Corporation. Companies that can mix well between existing strategies, technology, and resources will be able to survive well in competition with companies engaged in the same industry. This can be realized by determining the right supplier or supplier. Suppliers or suppliers are business partners who play a very important role in ensuring the availability of supply goods needed by the company, the performance of the supplier or supplier will affect the performance or performance of the company [2] [3] [4]. Therefore, companies need to assess suppliers or suppliers carefully and appropriately. Determination of suppliers is a strategic activity,

especially if the supplier will supply items that are important and will be used in the long term [5] [6].

PT. Nippon Indosari Corpindo Tbk, especially in the Purchasing section, is currently dealing with the problem of determining suppliers in providing tools that are often used as supporting materials for industrial machines, while the decision system for determining suppliers is accepted by PT. Nippon Indosari Corpindo Tbk is still manual. Suppliers are one of the most critical or important chains for the profits and survival of most companies. World-class companies know that the quality of their products and services is directly related to the quality of their suppliers or suppliers and the products and services they provide [7].

Determination of suppliers usually considers the quality of the product, service / service and on time delivery is important, although there are several other factors that must be considered [8] [9] [10]. Decision making in determining suppliers uses the AHP method, because it has good performance to analyze policies that involve qualitative and quantitative criteria. In addition, a decision support system by mixing several calculation methods is expected to produce good results and is suitable for determining suppliers with an outranking system so that eligible suppliers can be sorted based on the best value. So the authors propose the AHP method as a reference for decision support that can produce better decisions.

Fuzzy Multiple Attribute Decision Making (FMADM) is a method used to find the optimal alternative from a number of alternatives with certain criteria. The essence of Fuzzy MADM is to determine the weight value for each attribute, then proceed with a ranking process that will select the alternatives that have been given [11] [12] [13]. Basically, there are 3 approaches to find the attribute weight value, namely the subjective approach, the objective approach and the integration approach between subjective and objective. Each approach has advantages and disadvantages. In the subjective approach, the weight value is determined based on the subjectivity of the decision makers, so that several factors in the alternative ranking process can be determined independently. While in the objective approach, the weight value is calculated mathematically so that it ignores the subjectivity of the decision maker [14] [15] [16].

Analytical Hierarchy Process (AHP) Basically, the decision-making process is choosing an alternative. The main tool of AHP is a functional hierarchy with the main input being human perception. The existence of a hierarchy makes it possible to break down complex or unstructured problems into sub-problems, then arrange them into a hierarchical form [17] [18].

## 2. RESEARCH METHODS

### 2.1 Data analysis

The design of this supplier decision support system application uses the Analytical Hierarchy Process (AHP) method so that it can provide accurate decisions and have computational capabilities on many assessment criteria. The system that will be designed will conduct supplier selection based on the assessment score of each criterion, each alternative supplier assessment will be calculated in the Analytical Hierarchy Process (AHP) algorithm to produce the final value as the decision score of each alternative supplier as a determinant of supplier decisions.

### 2.2 Algorithm Analysis

The analysis of the system that will be built in this research is using the AHP (Analytical Hierarchy Process) method.

The steps in the Analytical Hierarchy Process Method are as follows:

- a. Defining the problem and determining the desired solution, then compiling a hierarchy of the problems encountered. The arrangement of the hierarchy is to set goals which are the goals of the overall system at the top level.
- b. Specifies the priority of the element.
- c. Measuring Consistency. In decision making, it is important to know how good the consistency is because we don't want a judgmental decision with low consistency.
- d. Calculate the consistency index (CI) with the formula:

$$CI = (\lambda \max - n) / n \dots\dots\dots (1)$$

Where:

n = number of elements.

- e. Calculate the consistency ratio (CR) with the formula:

$$CR = CI / CR \dots\dots\dots (2)$$

Where:

CR = Consistency Ratio

CI = Consistency Index

IR = Random Consistency Index

- f. Check hierarchy consistency. If the value is more than 10%, then the judgment data assessment must be corrected. However, if the consistency ratio (CI/IR) is less or equal to 0.1, then the bias calculation results are declared correct.

### 3. RESULTS AND DISCUSSION

#### 3.1 System Implementation Stages

The system implementation stage is a procedure carried out to complete the existing system in the approved design document and test it. The test method used is the Analytical Hierarchy Process method, which is one of the methods in a multi-criteria decision support system. An information system is expected to be able to provide useful and quality information. Useful information can be judged on the timeliness and relevance of the information.

- a. Login Form

To use the system, you must first log in, the login form interface is as shown below.

Figure 2. Login Form

- b. Main Menu Form

The main form will appear when the program is run, while the function of the main form is to contain menus as a link to other forms, the interface of the main form is as follows:



Figure 2. Main Form

- c. User Data Form

The user data form will appear if the user presses the data processing button on the main menu, the user data form functions to display how many users use the system.



Figure 3. User Data Form

d. Item Data Form

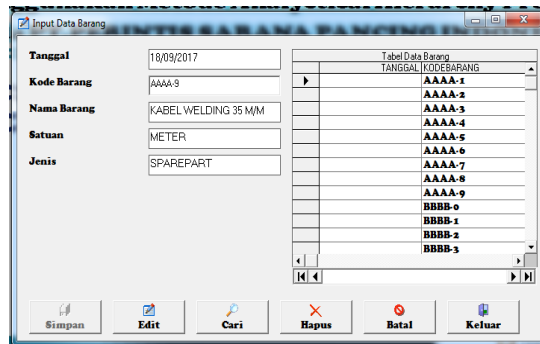


Figure 4. Item Data Form

e. Supplier Data Form

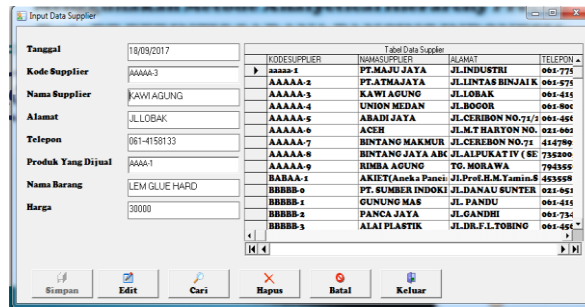


Figure 5. Admin Menu Form

f. AHP Process Form

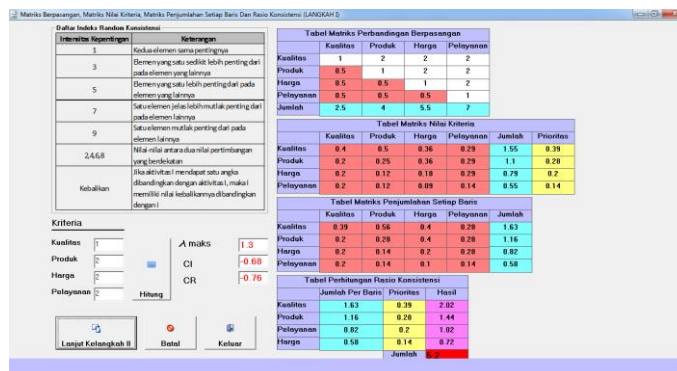


Figure 6. Physical Abnormalities Criteria Data Form

## g. Goods Purchase Form

TANGGALBELI	KODEBARANG
18/09/2017	AAAA-2
18/09/2017	AAAA-4
18/09/2017	AAAA-6
29/09/2017	aaaa-1

Figure 7. Goods Purchase Form

## h. Goods Return Form

TGL BELI	KODEBARANG
9/18/2017	AAAA-2
9/18/2017	AAAA-4
9/18/2017	AAAA-6
9/29/2017	aaaa-1

Figure 8. Goods Purchase Return Form

## 4. CONCLUSION

From the results of the analysis it can be concluded that; The application of the Analytical Hierarchy Process (AHP) method in the decision support system for determining suppliers for purchasing goods, namely by determining 4 criteria to determine suppliers for purchasing goods, including: quality, product, price, and service. Processed using the Analytical Hierachy Process (AHP) method, namely by calculating the normalized matrix, calculating the value of each criterion and sub-criteria.

The design of a decision support system for determining suppliers for purchasing goods is using UML (Unified Modeling Language) modeling, which consists of Use Case Diagrams, Activity Diagrams, and Class Diagrams. The program database uses Microsoft Access which consists of: Login Database, User Database, Goods Database, Supplier Database, Purchase Database and Purchase Return Database. The system was built using the Visual Basic 6.0 programming language, and the implementation of the system consisted of a login display, user display, goods display, supplier display, purchase display, purchase return display and report display.

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